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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/708,932	11/08/2000	Salman Akram	3434.1US (97-856.1)	4170

24247 7590 07/08/2002

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EXAMINER

MACKEY, JAMES P

ART UNIT PAPER NUMBER

1722

DATE MAILED: 07/08/2002

6

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.
09/708,932

Applicant(s)
AKRAM

Examiner
James Mackey

Art Unit
1722



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on Aug 13, 2001 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

- 15) ☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 2,3

4) ☐ Interview Summary (PTO-413) Paper No(s). _____

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____

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1. Claims 4, 5, 21, 22, 32, 33 and 38 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claims 4, 5, 21, 22, 32 and 33 only recite the functioning of the claimed apparatus during its intended operation, and the contents of the claimed apparatus during its intended operation; such does not set forth additional structure of the claimed apparatus and relates only to the intended use of the claimed apparatus, which does not patentably distinguish the claimed apparatus structure, and therefore does not further limit the subject matter of the apparatus claims. Note that intended use has been continuously held not to be germane to determining the patentability of the apparatus, *In re Finsterwalder*, 168 USPQ 530. The manner or method in which a machine is to be utilized is not germane to the issue of patentability of the machine itself, *In re Casey*, 152 USPQ 235. Purpose to which apparatus is to be put and expression relating apparatus to contents thereof during intended operation are not significant in determining patentability of an apparatus claim, *Ex parte Thibault*, 164 USPQ 666.

Claim 38 only recites a limitation regarding the product intended to be produced by the claimed apparatus; such does not set forth additional structure of the claimed apparatus and relates only to the intended use of the claimed apparatus, which does not patentably distinguish the claimed apparatus structure, and therefore does not further limit the subject matter of the apparatus claims.

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2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-5, 16, 18-24, 27, 29-33, 37, 38 and 41 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Ochiai et al. (U.S. Patent 5,643,831; col. 4, lines 57-60, and col. 6, lines 16-17). Note that Ochiai et al. clearly teach that the mold substrate plate is heated (col. 4, line 66), inherently teaching a heating element (claim 24) to accomplish such a heating function.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 6-11, 17, 25, 26, 28 and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochiai et al. (U.S. Patent 5,643,831).

Ochiai et al. '831 teaches the mold apparatus substantially as claimed, except for the cavity depth being "about 28 micrometers" (claims 6, 25, 34), except for the protective layer thickness being "from about 200 Angstroms to 5 micrometers" (claims 7, 26, 35), except for the particular shape of the cavity (claims 8-11, 36), and except for the mold substrate comprising ceramic material (claims 17 and 28).

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However, Ochiai et al. '831 explicitly discloses cavity depths of 70 to 100 micrometers (col. 6, line 62), and further discloses the relationship between cavity depth and the length of the side of the cavity mouth (col. 6, lines 63-67), including graphically correlating the side length to cavity depths of between 0-100 micrometers (as clearly shown in Figure 13), and Ochiai et al. also discloses the utility of forming solder bumps having a thickness of "several tens of μm " (col. 2, lines 38-39); therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ochiai et al. by providing a cavity depth of about 28 μm , since Ochiai et al. recognize the utility of solder bump products of similar thickness, and since Ochiai et al. disclose side lengths of the cavity mouth for a range of cavity depth which clearly overlaps the claimed cavity depth (see Figure 13).

Additionally, Ochiai et al. '831 (Figures 2-3) shows a protective layer thickness approximately corresponding to the upper end of the claimed thickness range. Therefore, it would have been obvious to a skilled artisan to have provided the silicon mold substrate with a silicon oxide or silicon nitride protective layer by oxidizing or nitriding the silicon mold substrate to a protective layer thickness within the claimed range in order to inexpensively produce the protective layer and to minimize altering the cavity shape/depth by the protective layer.

With regard to the shape of the cavity, trapezoidal, hemispherical, square and rectangular shaped cavities are conventional in the molding art for mold cavities for producing solder balls, and therefore it would have been obvious and well within the level of ordinary skill in the art to have provided the wedge-shaped, rhomboid-mouthed cavity of Ochiai et al. '831 in such

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conventional shapes, since each of the cavity shapes has recognized utility for forming solder balls. Furthermore, mold substrates formed of ceramic material are also conventional in the molding art for mold substrates for producing solder balls, and therefore it would have been obvious and well within the level of ordinary skill in the art to have provided the mold substrate of Ochiai et al. '831 of a ceramic material, since such is a recognized equivalent to silicon for use as a mold substrate for producing solder balls.

6. Claims 12-15, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochiai et al. (U.S. Patent 5,643,831) in view of Bolstad (U.S. Patent 2,979,773; column 2, lines 5-14).

Ochiai et al. '831 teaches the mold apparatus substantially as claimed, including disclosing that the mold substrate plate is heated (col. 4, line 66), except for disclosing a heater strip or plural heater strips located on another surface of the mold substrate. Bolstad discloses heater strips for efficiently providing heat to a semiconductor mold material 22. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ochiai et al. by providing heater strips on the exterior of the mold substrate, as suggested by Bolstad, in order to efficiently provide heat to the mold substrate plate as desired by Ochiai et al.

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Mackey whose telephone number is (703) 308-1195. The examiner can normally be reached on Monday-Friday from 8:30AM to 6:00PM. If attempts to reach the

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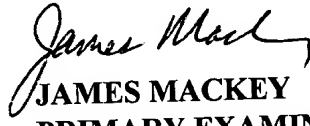
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examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Jan Silbaugh, can be reached at (703) 308-3829. The fax phone number for this Group is (703) 305-7718.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0651. Any inquiry relating to the contents or papers filed in this application, other than issues of substance requiring the attention of the Examiner, should be directed to the Customer Service Office, Technology Center 1700, whose telephone number is (703) 306-5665.

MACKEY/jpm
June 28, 2002


JAMES MACKEY
PRIMARY EXAMINER
ART UNIT 1722
6/28/02